REMARKS

This paper is being provided in response to the Office Action mailed August 12, 2004, for the above-referenced application. In this response, Applicants have amended claims 1, 2 and 7 and added new claims 9-14 in order to more particularly point out and distinctly claim that which Applicants deem to be the invention. Applicants respectfully submit that the modifications to the claims, and the new claims, are all supported by the originally-filed application. See, for example, page 11, lines 6-11 and page 12, beginning at line 11.

The rejection of claims 1-8 under 35 U.S.C. 102(e) as being anticipated by Japanese Patent Application Number 2002-084160 to Yoshihiro (hereinafter "Yoshihiro") is hereby traversed and reconsideration thereof is respectfully requested in view of amendments to the claims contained herein.

Claim 1, as amended herein, recites a surface mount crystal unit having a substrate for surface-mounting, a pair of connecting electrodes disposed on a principal surface of the substrate, a crystal blank have excitation electrodes and extension electrodes extending from the excitation electrodes to respective opposite sides of an end of the crystal blank where the opposite sides are fixed to the connecting electrodes by an electrically conductive adhesive, and a ridge corresponding to the end of the crystal blank and disposed on the substrate in spaced relation to the connecting electrodes. The ridge is recited as having a height greater than a thickness of the connecting electrodes. Claim 1 also recites that at least an outer portion of the ridge is an insulating material having a high bonding strength with respect to the electrically conductive adhesive. The electrically conductive adhesive is applied to the connecting

electrodes, a spacing between the connecting electrodes and the ridge, and an upper surface of the ridge. The crystal blank is recited as having an opposite end which remains lifted about the ridge from the principal surface of the substrate under shrinking force of the electrically conductive adhesive. Claims 2-6 depend from claim 1.

Claim 7, as amended herein, recites a surface mount crystal unit having a substrate for surface-mounting, a pair of connecting electrodes disposed on a principal surface of the substrate, a crystal blank having excitation electrodes and extension electrodes extending from the excitation electrodes to respective opposite sides of an end of the crystal blank where the opposite sides are fixed to the connecting electrodes by an electrically conductive adhesive, and a ridge corresponding to an end of the crystal blank and disposed on the substrate in contact with the connecting electrodes. The ridge is recited as having a height greater that a thickness of the connecting electrodes and being made of an insulating material. The electrically conductive adhesive is recited as being applied to the connecting electrodes and an upper surface of the ridge and a crystal blank has an opposite end which remains lifted about the ridge from the principal surface of the substrate under shrinking forces of the electrically conductive adhesive. Claim 8 depends from claim 7.

Yoshihiro discloses a surface acoustic wave device having a substrate (21) for surface-mounting, a pair of connecting electrodes (22, 23) disposed on a principal surface of the substrate, a crystal blank (3) having excitation electrodes (31, 33) and extension electrodes extending from the excitation electrodes to respective opposite sides of an end of the crystal, the opposite sides being fixed to the connection electrodes by an electrically conductive adhesive

(24) and a bump (5) corresponding to the end of the crystal blank and disposed on the substrate in spaced relation to the connecting electrodes. Applicants are providing herewith a translation of paragraph 31 of Yoshihiro, which states:

> Electrode pads 22, 23, conductive film 24 for sealing, and bump 5 which are described above, are composed of metal such as molybdenum and tungsten. These conductors (electrode pads 22, 23, conductive film 24 and bump 5) are formed by baking of conductive paste on the surface of substrate 21, and then treating by Ni- and Au- plating. Conductor which functions as an underlying conductive layer of electrode pads 22, 23 is formed by a printing process using the above-described metallic paste. After drying, the above-described metallic paste is printed again in the shape of the bump on the surface of the conductor. Then, both the conductor and the bump are baked together followed by plating process.

Applicants respectfully submit that Yoshihiro does not show, teach, or suggest features recited in claim 1, as amended herein, where the ridge (bump) has at least an outer portion that is an insulating material having a high bonding strength with respect to the electrically conductive adhesive. Instead, the ridge (bump) of Yoshihiro is specifically disclosed as being made of a metal. As described on page 4 lines 6-17 of the present application, the electrically conductive adhesive is a mixture of organic material and electrically conductive filler and thus generally has a less tendency to adhere to metal than to an insulating material such as ceramics. When a mechanical shock is applied to the conventional surface mount crystal unit in which the ridge portion is made of metal (as in Yoshihiro), the conductive adhesive is liable to peel off the interface between the conductive adhesive and the ridge. The conductive adhesive may also peel off connecting electrodes.

The present claimed invention addresses this by reciting that at least the outer surface of the ridge is an insulating material having a high bonding strength with respect to the electrically conductive adhesive. As set forth in claim 1, the ridge is disposed on a surface of the substrate and space relation to the connecting electrodes and the electrically conductive adhesive is applied to the connecting electrodes, a spacing between the connecting electrodes and the ridge, and an upper surface of the ridge. With this arrangement, as the ridge is spaced from the connecting electrodes, the electrically conductive adhesive is joined to the exposed surface of the substrate made of an insulating material, and hence has an increased bonding strength. Consequently, the present claimed invention has excellent shock resistance.

Similarly, in claim 7, a ridge is disposed on the surface of the substrate in contact with connecting electrodes and the electrically conductive adhesive is applied to the connecting electrodes in an upper surface of the ridge. With this arrangement, the surface mount crystal has excellent shock resistance. In contrast, for Yoshihiro, since the ridge is made of a metallic material (which does not effectively bind with the electrically conductive adhesive), no electrically conductive adhesive is applied to an upper surface of the ridge since the electrically conductive adhesive would not adhere to the ridge of Yoshihiro. Thus, Yoshihiro does not show, teach, nor suggest electrically adhesive applied to the upper surface of the ridge as set forth in claim 7 of the present application.

Generally, in contrast to the present claimed invention, Yoshihiro does not show, teach, or suggest the concept that the bonding strength of the electrically conductive adhesive is improved by joining the electrically conductive adhesive to the ridge. This is because Yoshihiro

discloses the ridge being made out of metal, which does not adhere especially well to the electrically conductive adhesive. Accordingly, the improved shock resistance obtained by the present claimed invention is not obtained by Yoshihiro.

Based on the above, Applicants respectfully request that the Examiner reconsider and withdraw all outstanding rejections and objections. Favorable consideration and allowance are earnestly solicited. Should there be any questions after reviewing this paper, the Examiner is invited to contact the undersigned at 617-248-4038.

Respectfully submitted,
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